REMARKS

The Examiner rejected Claims 1 - 3 and 11 - 13 under 35 U.S.C. 103(a) as being unpatentable over Miura in view of Sunhara et al. The Examiner further rejected Claims 4 and 5 under 35 U.S.C. 103(a) as being unpatentable over Miura in view of Sunhara et al. and further in view of Nasu. The Examiner further rejected Claims 17 - 19 under 35 U.S.C. 103(a) as being unpatentable over Miura in view of Sunhara et al. and further in view of Nasu, Ominato, and Carabello.

In response the Applicant has amended the claims such that new independent claim 2 contains all the limitations of original Claims 1, 2, and 11:

2. An apparatus for cutting sheet metal pieces from a sheet metal coil, said sheet metal coil having a coil axis, said apparatus comprising:

a coil support adapted to support said sheet metal coil such that same may rotate about said coil axis to unroll an end portion of said sheet metal coil;

a substantially flat sheet support adapted to support said end portion for cutting;

a cutting head mounted above said sheet support and end portion and operative to cut through said end portion;

a cutting head drive operative to move said cutting head back and forth along a first path substantially parallel to said coil axis;

a plurality of straightening rollers operative to flatten said end portion such that same lies flat on said sheet support;

a sheet metal drive operative to move said end portion forward and rearward along a second path substantially perpendicular to said coil axis;

a coil drive operable to rotate said sheet metal coil about said coil axis;

a computer operative to control and coordinate said cutting head drive and said sheet metal drive such that said pieces are cut from said end portion.

The Applicant has also amended Claim 18 to read:

18. A method of cutting sheet metal pieces from a sheet metal coil, said sheet metal coil having a coil axis, said method comprising:

positioning an end portion from said sheet metal coil to rest flat on a sheet support;

providing a plurality of straightening rollers operative to flatten said end portion such that same lies flat on said sheet support;

moving a cutting head back and forth above said end portion and said sheet support along a first path parallel to said coil axis to cut said end portion;

moving said end portion forward and rearward along a second path perpendicular to said coil axis;

coordinating the movements of said cutting head and said end portion along said first and second paths with a computer such that said pieces are cut from said end portion; and

rotating said sheet metal coil so as to maintain a slack portion of sheet metal between said sheet metal drive and said sheet metal coil.

The Examiner indicated that Miura discloses "a coil drive operative to rotate the coil (141 and 142)" and that Miura and Sunhara et al. disclose "a computer operative to rotate the coil in a sheet advancing direction".

Miura is addressed to overcoming the problem of a change in force required by a sheet drive when drive must not only move the sheet forward, but must also rotate the roll from which the sheet is being drawn. The problem is described at col. 1, lines 37 - 45:

> "The image lengthy in the feeding direction of the rolled cutting sheet, i.e., in the y direction is cut out by the cutting pen while the rolled cutting sheet is fed in the y direction. However, the cutting may confront an abrupt increase in feeding resistance of the cutting sheet during cutting. <u>This is caused by existences of a firmly rolled part and an already fed part drawn from the firmly rolled part</u> in the cutting sheet on use in the device of this type. This is because cutting of a portion exceeding the already fed amount requires superfluous force for loosening the rolling of the rolled part although the cutting is normally carried out for the already drawn cutting sheet."

The Applicant respectfully submits that Miura addresses this problem, not by driving the coil as in the present invention, but rather by ensuring that a sufficient length of sheet material to execute a cutting order is drawn off the coil prior to executing the cutting order. At col. 2, lines 57 - 63 cited by the Examiner Miura says:

> "Referring to FIG. 1, a housing 130 is furnished with a platen 110, a first support roller 141, a second support roller 142 and a setting bar 143 in predetermined place. The first and second support rollers 141 and 142 may rotate respectively, and, for example, as shown in FIG. 4, a rolled part 150 of the roll type cutting sheet gets on those first and second support rollers 141 and 142."

Miura does not drive the rollers 141, 142 but states they are "support rollers" that "may rotate", thus allowing the coil 150 to rotate. The actual force that rotates the coil 150 is provided by pulling on the end of the coil, either by the operator, or by the Y-directing motor 160 driving the drive roller 111. The operation of Miura is described as follows at col. 3, lines 22 - 55:

> "Referring to FIG. 9, an end portion of the cutting sheet 151 is first set at a home point of the cutting plotter at step S1. This action is shown in FIGS. 3 to 5. FIG. 4 shows a state in which an operator draws the cutting sheet 151 from the rolled part 150 of the roll type cutting sheet mounted on the first and second support rollers 141 and 142, and sets it onto the cutting plotter. The cutting sheet 151 is drawn until it goes over the drive roller 111, the cutting mat 113 and the setting bar 143. The drawn sheet 151 is turned back around the setting bar 143, and as seen in FIG. 3, the turned back cutting sheet 151 is aligned at an end thereof with the cutting sheet 151 still resting on the platen 110. At completion of this alignment, the pinch roller 112 shown in FIG. 4 is brought down to support the cutting sheet 151. Until this operation is the operator's role. Subsequently, as shown in FIG. 5, the Y-directing motor 160 is reversely driven to feed the cutting sheet in a reverse direction so as to position the end point of the cutting sheet 151 at the home point. In this connection, the home point is meant by a reference point for performing the cutting action.
>
> As seen in steps S2 to S4 of FIG. 9, the cutting sheet 151 is fed by a predetermined length L. This action is shown in FIGS. 6 and 7. The drive roller 111 is rotated in the +Y-direction in such a manner that the length of the cutting sheet 151 to be drawn from the roll type cutting sheet 150 becomes L. The drawing length of the cutting sheet 151 at this time is available by controlling a rotation amount of the Y-directing motor 160. Then the fed amount L of the cutting sheet 151 is stored by the cutting plotter 100 in a

> memory provided in means for controlling the fed amount. The state shown in FIG. 7 is that the cutting sheet 151 is reversely fed to re-position it to the home point (step S4 of FIG. 9). With the above operation, a preparation for the cutting action is accomplished."

Thus in Miura the end of the sheet 151 from coil 150 is pulled by hand over the drive roller 111 and cutting mat 113, then under the setting bar 143 and back over the sheet so that the edges can be aligned, presumably so that the sheet will travel straight. Once aligned, the pinch roller 112 is brought down onto to the drive roller 111 to pinch the sheet so rotation of the drive roller will move the sheet.

The drive roller 111 is reversed to bring the sheet back to the "home point" in Fig. 5 such that a slack portion 151 falls down ahead of the coil 150. Then in Fig. 6 the Y-directing motor 160 rotates the drive roller 111 to pull off a length of sheet "L" which is stored in the memory. The Y-directing motor is then reversed to the home point with the length "L" hanging between the coil 150 and the drive roller 111.

The cutting operation of Miura is then described at col 3, line 56 to col. 4 line 6:

> "At step S5 of FIG. 9, a first cutting order is inputted to the cutting plotter 100, and at step S6, calculation is made for a maximum amount Lm in the Y-direction of this cutting order. Then, Lm is subsequently compared with the fed amount L stored in the means for controlling the fed amount at step S7. If Lm is not more than L (since a feeding amount by this cutting order is within the drawn and already fed amount L), cutting is executed as it is at step S10. If Lm exceeds L (since, if the cutting is executed as it is, the roll type cutting sheet must be drawn from the rolled part 150 on the way so that the feeding resistance is abruptly increased), a compensation feed action is executed (step S8 in FIG. 9) for feeding the cutting sheet 151 on a unit of L in regard to an excessive amount of Lm. At step S9, a further feed amount in this compensation feed action is added to the already fed amount made by the fed amount controlling means. Then, cutting is executed according to the cutting order at step S10."

Thus the cited prior art of Miura does not disclose the coil drive of the present invention. Further, the cited prior art of Sunhara, Ominato, and Carabello also does not disclose a coil drive.

Further with respect to the disclosure of Nasu, the Applicant respectfully submits that Nasu does not provide an apparatus for cutting coiled sheet material but provides a belt on which a sheet is laid and moved back and forth under a cutting head. The Applicant respectfully submits further that Nasu does not disclose a coil drive. The coil 4 pointed out as the coil by the Examiner is a belt take up roller as described at col. 4, lines 50 - 56 as:

> "take-up rollers 4 freely pivotally supported to the front and rear ends of the frame 1 from therebelow. Belt driving motors 5 are provided on the front and rear ends of the frame 1. The arrangement is such that support belt 3 can be wound up on either of the take-up rollers 4 by operating the motors 5."

Further the Applicant has amended the independent Claims 2 and 18 to require that the end portion must rest flat on the sheet support. Sheet metal coil, as compared to the sheet material used in Miura, is much more rigid and so will tend to hold a curved configuration once drawn off the coil and must be forced to lay flat on the sheet support, as described in the Applicant's disclosure. This rigidity also means that the apparatus of Miura could not be used to cut sheet metal since sheet metal would not hang down in the manner required by the Miura apparatus.

The Examiner has stated that such straightening rollers are provided by the rollers 111, 112 in Miura. The Applicant respectfully submits that the rollers 111, 112 could not perform the flattening function. The rollers are mounted in a pinching arrangement such that they bear against each other - the sheet metal would simply pass between them, and not be forced into a flattened orientation. Such flattening rollers are also not disclosed in any the other cited prior art.

The Applicant respectfully submits that the coil drive and flattening rollers of Claims 2 and 18 are not disclosed in the cited prior art. Thus the Applicant submits that the subject matter of Claims 2 and 18, as a whole, would not be obvious to a person skilled in the art.

Further the Applicant submits that Miura teaches away from the present invention in that Miura draws the material off the sheet prior to making the cut, and then reverses the sheet to ensure that a slack portion is present so that the drive roller does not have

to rotate the coil during the cutting operation. In the apparatus of the present Claims 2 and 18, provision is made to instead rotate the coil forward and backward.

In the embodiment of Claim 4, the computer can rotate the coil in concert with the sheet metal drive so that the drive is not required to pull material off the roll. In the present inventions of Claim 5 and Claim 18, a slack portion is further provided to reduce the precision required of the coil drive.

Further with respect to the Applicant's Claim 12, the sheet support "is oriented such that there is an open space beneath said end portion under said first path such that cutting debris can fall through said open space". Miura appears to require a backing under the cutting tool, opposite to the apparatus of Claim 12. Thus if the apparatus of Miura was modified as in the invention of Claim 12, its functionality would be destroyed.

With respect, the Applicant submits that the invention of the amended claims submitted herewith is not made obvious by Miura, Nasu, and the other cited prior art.

With respect to the dependent claims the Applicant relies on the above.

Applicant has made an earnest effort to be fully responsive to the Examiner's objections and believes that Claims 2 - 10, 12 - 16, 18, and 19 are now in condition for allowance. The applicant solicits the allowance of Claims 2 - 10, 12 - 16, 18, and 19.

If, however, the Examiner should for any reason consider this application not to be in condition for allowance he is respectfully requested to telephone the undersigned attorney at the number listed below prior to issuing a further Action.

Respectfully submitted,

Wilf Koenders

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Beth O'Bryan

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